

Telecommunications Regulatory Affairs Advisory Committee

Numbering Arrangement for Machine-to-Machine Communications

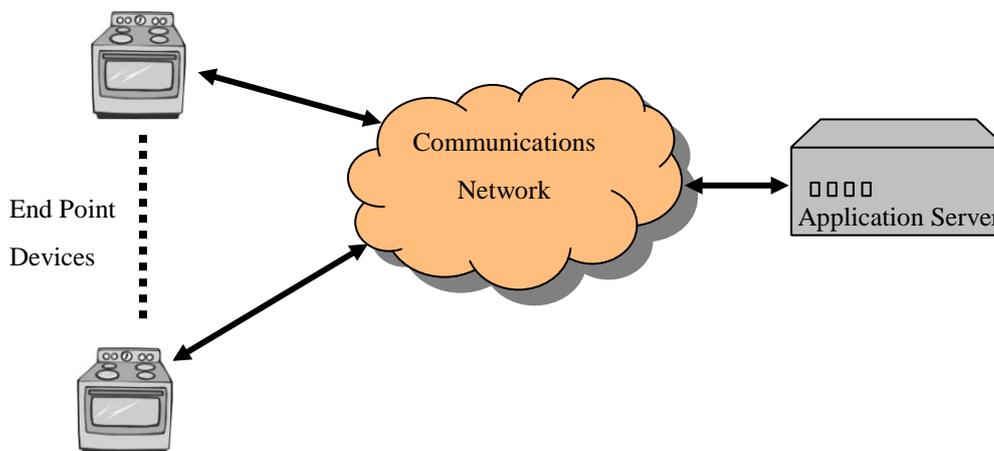
Purpose

This paper proposes the assignment of a dedicated numbering range for meeting the demand of machine-to-machine (“M2M”) communications services.

Background

2. M2M communications refer to the communications between machines/devices where data can be exchanged in an automatic or scheduled manner with little or no human intervention. M2M communications can be used for a wide range of industrial and commercial applications such as telemetry, remote control, remote monitoring, smart metering, fleet control, logistics support and tracking, home security, smart payment, etc.

3. M2M communications can be characterized by three basic building elements: (a) end point devices; (b) communications network; and (c) application server. End point devices, usually equipped with sensors or control units, are deployed to exchange the required information with the application server or to execute certain instructions as instructed by the application server via the communications network. The communications network can be a wired, wireless or any hybrid network which links up end point devices and the application server. The application server executes a set of processes defined by an M2M application. An example of M2M application is a set of devices that monitor road traffic in a city and regularly communicate such traffic information to a control centre so that the traffic situation of the whole city can be closely monitored by officers in the control centre.



Basic Building Elements of M2M Communications

Addressing Methods for M2M Communications

4. Public communications networks are often used in wide area M2M communications. This will have an impact on the numbering and addressing resources as each M2M device will need to be uniquely addressed (i.e. either globally unique or locally unique) for the exchange of data using public communications networks. The use of telephone numbers and Internet Protocol ("IP") addresses are the common addressing methods.

5. The telephone number addressing method used in public mobile networks and public switched telephone network is based on the ITU-T Recommendation E.164 (i.e. generally called E.164 numbers). In view of the anticipated rapid growth of M2M applications, there is a need to plan ahead the number allocation arrangement for M2M services in order to ensure adequate supply of M2M numbers in future and at the same time avoid the depletion of the E.164 numbering resources for other telecommunications services.

Past Discussions

6. The number allocation arrangement for M2M services was previously discussed in the former Numbering Advisory Committee

(“NAC”) in November 2011 and the Telecommunications Regulatory Affairs Advisory Committee (“TRAAC”) in April 2013 respectively. In November 2011, the former NAC first discussed the subject matter vide NAC Paper No. 3/2011 entitled “Numbering Arrangement for Machine-to-Machine Communications”¹ and considered the proposal of introducing 12-digit numbers starting with “450X” for M2M services. With different views from members, there was no decision made by the NAC before its dissolution in March 2012.

7. Following the establishment of the Communications Authority, the numbering issues were subsumed within the scope of the TRAAC. In January 2013, the Telecommunications Numbering Working Group (“TNWG”) under the TRAAC discussed the M2M numbering issue again. Considering that the M2M demand remained low and there were still networks of certain operators that did not support the routing of 12-digit subscriber numbers, TNWG came to a view that as there was no urgent need to allocate 12-digit numbers for M2M services, it would continue to keep in view the development of M2M services and revisit the matter in due course. The TRAAC noted the recommendation by the TNWG at its April 2013 meeting vide TRAAC Paper No. 3/2013 entitled “Proposals of the Telecommunications Numbering Working Group”².

Allocation of a New Number Level for M2M Services

8. Until lately, forecasts from a number of research and consultancy firms indicated that globally, there would be a rapid growth in the number of M2M devices connected to the public networks in the next 10 years. With the need to consider the long term development of the Hong Kong Numbering Plan in view of the possible shortage of 8-digit numbers for mobile services, the TNWG resurrected the discussion on the M2M number arrangement in July 2014 with a view to working out a sustainable number allocation plan for M2M services.

¹ The paper can be downloaded from
http://tel_archives.ofca.gov.hk/en/ad-comm/nac/paper/nac2011p3.pdf

² The paper can be downloaded from
http://www.ofca.gov.hk/filemanager/ofca/en/content_757/traac03_2013.pdf

E.164 Numbers with 12-digit Length for M2M Services

9. Under the Hong Kong Numbering Plan, all the subscriber numbers allocated to fixed, mobile and paging services are of 8-digit length. Taking into account the amount of available number blocks in the numbering plan and the rate of number applications by operators, it is possible that the existing 8-digit numbering plan will be used up and there will be a need to migrate to longer digits in 2020s. As the demand for numbers by M2M services may have significant growth in the coming years, the continued assignment of 8-digit numbers for M2M services will further shorten the life time of the existing 8-digit numbering plan. Hence, the continued assignment of 8-digit numbers to M2M services may not be desirable.

10. Unlike normal subscriber numbers, numbers assigned for M2M services are dedicated to communications between devices and are not supposed to be directly called by ordinary users. M2M numbers need not be “easy to remember” and can be of a longer digit length. For better management within the existing numbering plan, it is advisable to allocate a new vacant number range for M2M services.

11. The proposal of using “450X” numbers with digit length of 12, which was first proposed in the then NAC in 2011, remains a viable option for M2M services. Under the existing numbering plan, the leading digit “4” is allocated for network numbers used by operators for the support of number portability for both fixed and mobile services. The digit length of “4X” numbers is within 12 as specified in the numbering plan, such that it is in line with the E.164 requirement. Currently, only around 41% of “4X” numbers have been allocated to operators with the remaining 59% available for further allocation. As the number demand for M2M services is uncertain at the moment, it is proposed to first make available “4500X” numbers with digit length of 12 (i.e. 100 million numbers) for such kind of applications. The remaining numbers in “450(1-9)X” will be reserved for the growth of M2M applications and other similar applications that may be introduced in the future. Based on the above proposal, the “450X” range can provide a maximum of 1 billion numbers for M2M applications leaving the remaining unallocated 4X numbers to support the future demand for

network numbers and other services³.

Restrictions for the Proposed 12-digit M2M Numbers

12. Since M2M numbers are assigned to machines instead of end users, it is not necessary to impose the number portability requirement for 12-digit M2M numbers as users of these numbers may not have any strong needs to retain the originally assigned 12-digit M2M numbers when switching operators. In case there is a need to use another set of new M2M numbers after switching the operator, the numbers stored in the application server(s) and/or end point devices should readily be updated or re-programmed. As such, it is suggested that **there is no need to impose number portability requirement on the 12-digit M2M numbers.**

13. Some fixed and/or mobile network operators advised that their networks do not support numbers with 12-digit length and hence inter-network routing of 12-digit numbers for M2M services. These operators would need time and funds to upgrade their networks to support inter-network routing for 12-digit numbers. In view of such a technical constraint, it is therefore suggested that **there should not be any mandatory requirement for 12-digit M2M numbers to be routed across networks.** However, for those operators which support 12-digit length and inter-network routing of 12-digit numbers for M2M services, they may freely enter into commercial arrangements with their interconnecting partners for routing of 12-digit M2M numbers across networks based on their own business decisions. Under such a market driven approach, users of M2M numbers may procure services from a single operator supporting 12-digit M2M numbers, or they may procure services from two or more operators supporting the inter-network routing of 12-digit M2M numbers.

14. There is possibility that the end point device may be brought outside Hong Kong. Under such a circumstance, its M2M communication can still function via the overseas mobile network operators which have entered into commercial roaming agreement with

³ Some of the un-allocated 4X numbers may be re-allocated for mobile services, subject to the new number level allocation for mobile services to be adopted by the Communications Authority.

the local mobile network operator providing the M2M service and number to that end point device.

15. Furthermore, as the 12-digit numbers for M2M services are expected to be assigned to machines but not subscribers, these numbers will only be used by M2M devices for automatic or scheduled transmission of data, but not for voice or ordinary SMS applications. These 12-digit M2M numbers are by nature different from ordinary subscriber numbers. In order to maintain sufficient differentiation between 12-digit M2M numbers and other ordinary 8-digit numbers, it is considered appropriate to impose specific restrictions on the 12-digit M2M numbers, such that **these 12-digit M2M numbers should not be used for voice and SMS communications**. In case any M2M application would require communications via SMS, operators should assign ordinary 8-digit numbers for the application.

16. In the light of the above considerations, “4500X” numbers are proposed for allocation to M2M services without the requirements to support number portability and inter-network routing. Voice and SMS services will not be provisioned for the proposed “4500X” numbers. Besides, “450(1-9)X” numbers are proposed to be reserved for the growth of M2M services in the future.

Criteria for Applying for Additional M2M Number Blocks

17. It is proposed that operators who are eligible to apply for ordinary subscriber numbers may also apply for 12-digit numbers for the provision of M2M services. These operators include mobile network operators, mobile virtual network operators (“MVNOs”)⁴, fixed network operators, services-based operators in providing Class 1 or Class 2 services and paging operators. It is proposed that each of these eligible operators may initially apply for a block of “4500XXX” numbers (i.e. 100k numbers with digit length of 12). In line with the existing criterion of allocating additional subscriber number blocks, additional number blocks for M2M services will allocated should the prevailing utilisation rate threshold be exceeded.

⁴ MVNOs who are eligible to apply for subscriber numbers are described in Appendix 4 of “Code of Practice Relating to the Use of Numbers and Codes in the Hong Kong Numbering Plan”.

Recommendation

18. To summarise, it is recommended that –
- (a) “4500X” numbers with digit length of 12 will be allocated for M2M services and “450(1-9)X” numbers with digit length of 12 will be reserved to meet the future demand for M2M services;
 - (b) the numbers in (a) will not support number portability and inter-network routing. Meanwhile, these numbers are not allowed to be used for voice and SMS services;
 - (c) mobile network operators, MVNOs, fixed network operators, services-based operators in providing Class 1 or Class 2 services, and paging operators who provide M2M communications through the public telecommunications network using E.164 numbers may initially apply for a block of “4500XXX” numbers (i.e. 100k numbers for digit length of 12). Additional number blocks for M2M services will be allocated should the prevailing utilisation rate threshold be exceeded; and
 - (d) the Hong Kong Numbering Plan and the “Code of Practice Relating to the Use of Numbers and Codes in the Hong Kong Numbering Plan” will be updated to reflect the allocation / reservation of “450X” numbers for M2M services.

Advice Sought

19. Members are invited to give views and comments on this paper including but not limited to the recommendations given in paragraph 18 above.

**Office of the Communications Authority
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